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The Mexican Bean Beetle

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Beetle and Larvae Feeding on Bean Foliage

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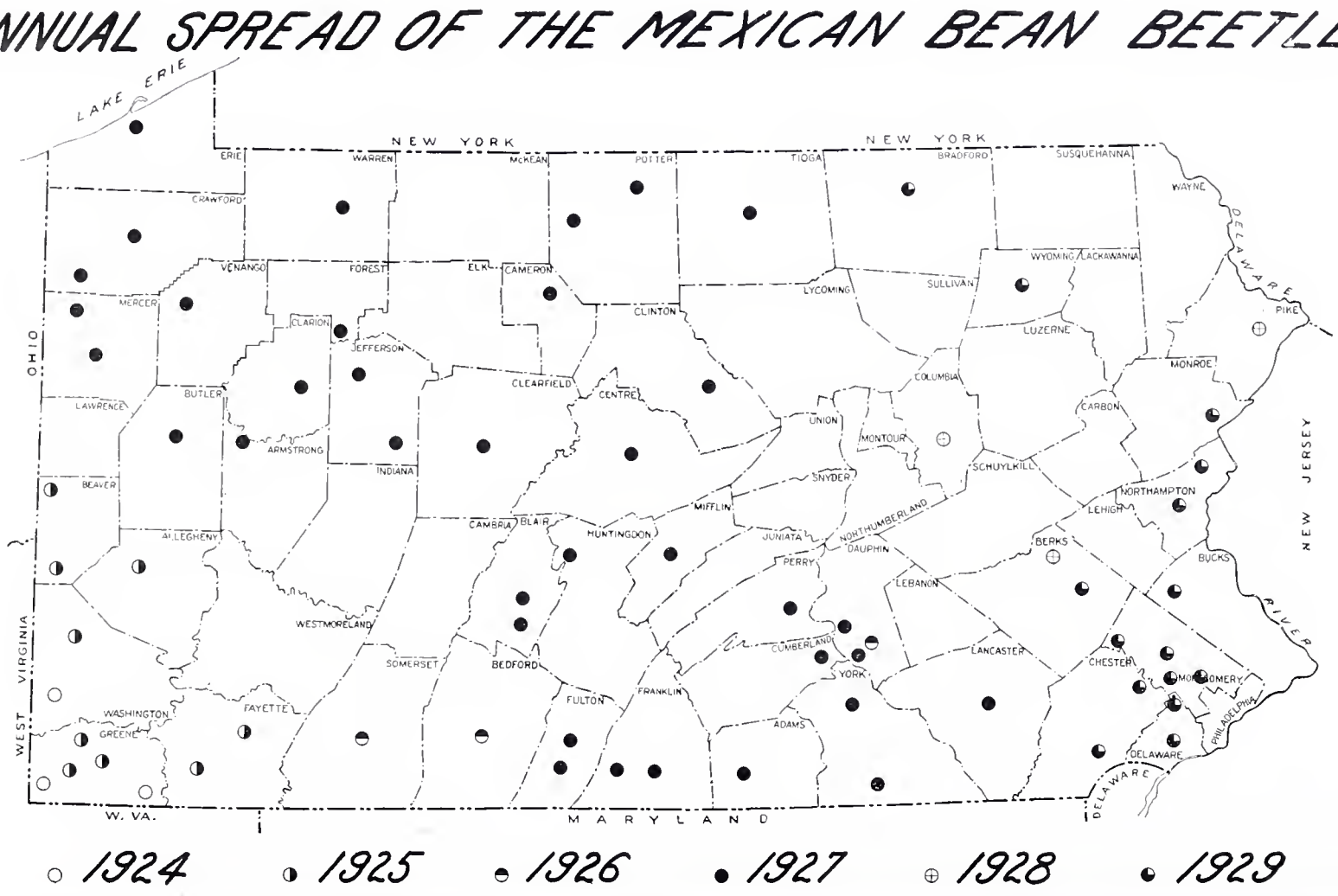
ANNUAL SPREAD OF THE MEXICAN BEAN BEETLE
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SULLIVAN
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DELAWARE
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COLUMBIA
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DAUPHIN
BERKS
PERRY
BUCKS
NEW JERSEY
LEBANON
WEST VIRGINIA
WESTMORELAND
CUMBERLAND
LANCASTER
SOMERSET
BEDFORD
YORK
CHESTER
MONTGOMERY
WASHINGTON
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GREENE
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DELAWARE
DELAWARE
RIVER
W. VA.
MARYLAND
1924
1925
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1927
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1929

Fig. 1.

The Mexican Bean Beetle

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The Mexican bean beetle (*Epilachna corrupta* Muls.), a native of southern North America, has been known to occur in the southwestern part of the United States for about 81 years. This insect first appeared in the eastern part of the country, namely, Alabama, in 1920. Since that date, the pest has spread rapidly through the eastern states, including Pennsylvania.

Spread Through Pennsylvania

The beetles were first observed in Washington and Greene Counties in 1924 (Fig. 1). In 1925 they were found in Beaver,

Fig. 2. Mexican Bean Beetle Injury on Garden Beans.

Allegheny and Fayette Counties. In 1926 they were discovered as far east as Dauphin County. In 1927 a survey showed that

* Photographs by H. B. Kirk.

the insect had covered two-thirds of the state, including Tioga County and all the counties west of this. Records in 1928 showed that there were infestations in Berks, Columbia and Pike Counties. In 1929 we believe that the beetles had spread to every county in the state.

Unlike many of our other introduced pests, the rapid spread of the Mexican bean beetle has been largely due to its migratory habits. After they have laid a few eggs, it is often the tendency of the beetles to go to different plants in other localities to lay more eggs.

Injury to Beans

The Mexican bean beetle, although a pest of all kinds of beans grown in gardens, has also been recorded as feeding on beggarweed

Fig. 3. Mexican Bean Beetles Feeding on Bean Pods.

(*Mebomia* sps.), soy beans, alfalfa and sweet clover. In a garden in southwestern Pennsylvania where the infestation was heavy and where pole beans were growing on corn, the leaves of the corn were badly eaten. This is unusual, for the insect is not a pest of corn.

Both the larvae and adults eat the surfaces from the under sides of the leaves, thus leaving somewhat lace-like areas which fall out later in the season. The old work, where the areas have fallen out, resemble hail injury. The fresh work is quite charac-

teristic and is not likely to be mistaken for feeding of any other insect (Fig. 2).

Both the larvae and the adults are ravenous feeders and are capable of destroying a bean patch in a very short time. Due to the fact that the life history is passed on the under surfaces of bean leaves, the presence of insects on the plants is often unnoticed, until the foliage is practically destroyed (See Cover Page Illustration). Where the infestation is extremely heavy the pods of string beans are often eaten (Fig. 3).

It was observed that the insect did more damage to garden beans than to lima beans grown together at Rutherford, Dauphin County (Fig. 4). However, lima bean plants are often riddled in the same way as are string beans.

Life History

The Mexican bean beetle adults hibernate through the winter months in woods and rubbish in the vicinity of bean fields.

The fully-matured adults (Fig. 5) are hard shelled copper colored beetles about ¼ of an inch long and 7/32 of an inch wide,

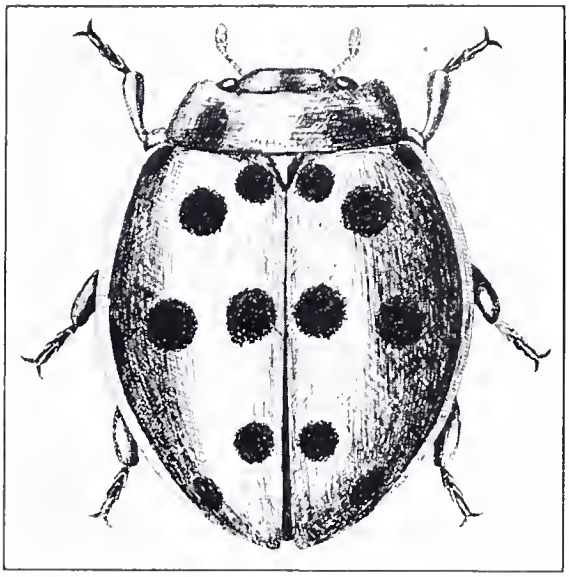
Fig. 4. Mexican Bean Beetle Injury on Garden and Lima Beans.

being hemispherical in form. Each wing cover bears eight black spots which are arranged in transverse rows. Adults which are

not fully developed are light lemon yellow, but the color soon changes to the copper as the adults get older.

At Rutherford, the overwintering adults first appear in the spring about the time string bean plants have their first two leaves. Their appearance will depend largely upon climatic conditions. Just as soon as the adults come out of hibernation they go to bean plants and start feeding on the under sides of the leaves. Occasionally they will get on the upper surfaces of the leaves to get the early morning sun when the temperature is low.

The eggs, which are about one-twentieth of an inch long are orange colored, and laid in clusters on the undersides of the bean



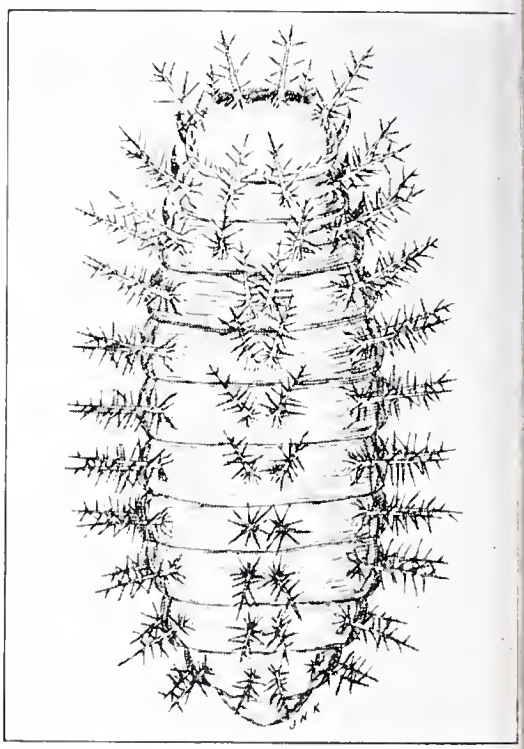


Fig. 5. Mexican Bean Beetle Adult (left).
Fig. 6. Mexican Bean Beetle Larva (right).

leaves (Fig. 8). These appear shortly after the adults emerge from their winter hibernation or about June 3 at Rutherford (Fig. 7). The eggs hatch in about ten days, depending on the temperature.

The young larvae upon hatching from the eggs are yellow in color, and covered with small spines. They have six legs and are capable of rather slow locomotion. These larvae usually feed on the under surfaces of the bean leaves where they cause considerable injury to the plants. When they have reached maturity or are fully grown (Fig. 6) they become rather plump and sluggish

in their movements. They then move to other leaves or other plants, where they attach their back ends to the leaves before transforming to the pupal stage. This is the resting stage which lasts about five days if the weather is warm. There seems to be a tendency of the larvae to congregate on a single leaf or in groups to transform to pupae.

At Rutherford the first pupae were observed on July 4, but this will depend on the season. The pupae are cream colored and hang by their back ends from the under surfaces of the leaves. The old larval skins remain attached to the back ends and give them a somewhat spiny appearance. These pupae darken just before transformation. The adults of the first generation appeared about July 10th. These adults start to feed on the foliage and to lay their eggs on the under surfaces of the leaves as before. These eggs hatch about July 22 to form a second generation the life history of which runs quite similar to that of the first lot.

The second generation larvae became full grown and pupated

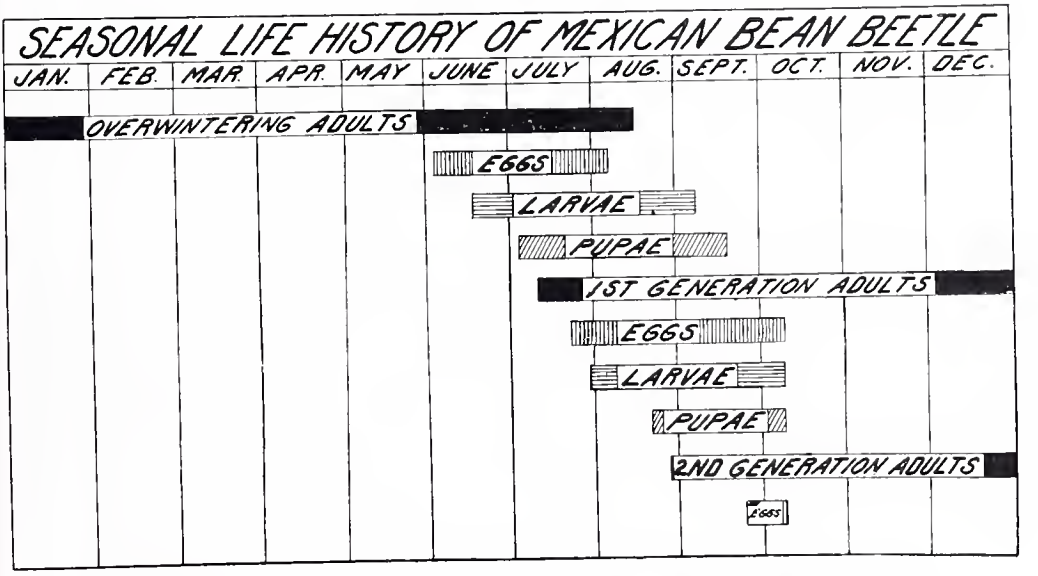


Fig. 7. Diagramatic Life History of the Mexican Bean Beetle.

about August 20. The newly emerged adults appeared on August 26. As stated before, the life history of the Mexican bean beetle will vary with the season. It is quite remarkable that an insect which has migrated from such a southern latitude is able to withstand the low temperatures, and change in humidity of the East.

The emergence of the overwintering adults in the spring depends largely upon the climatic conditions. The first heavy frost in the fall usually cuts short the progress of the beetles, for the larvae and pupae are killed by temperatures below the freezing point. Adults which have not sufficiently hardened are also killed

in this way. During a year with an early spring and a late fall, it is quite likely that we would get a partial third generation at Rutherford. Eggs laid by the second generation adults failed to hatch in 1929, and were killed by a heavy frost on October 8. In 1928 the killing frost took place on October 26, and in 1927 on November 7.

There is a great overlapping of generations and it was observed that adults of the overwintering generation caged in the field were living up to August 15. Eggs of these overwintering adults were present on August 6.

While no adults of the overwintering generation were found to go into hibernation the second year, it was observed that the first and second generation adults were quite capable of passing

Fig. 8. Mexican Bean Beetle Eggs.

the winter. The mortality of the overwintering adults is high and those which have not fully colored by the time of cold weather, are most apt to succumb. There is a tendency of the

overwintering adults and adults of the first and second generations to migrate after they have laid a few eggs.

Natural Enemies

The Mexican bean beetle does not seem to have many natural enemies, and those which it has do not tend to hold it in control. Nymphs and adults of one of the stink bugs (*Podisus maculiventris* Say) were found to feed on the larvae, pupae and adults at Rutherford.

Control Measures

In view of the fact that the Mexican bean beetle cannot be controlled by natural enemies, artificial control measures have to be resorted to. Results of trials of various insecticides suggested by the United States Department of Agriculture and state experiment stations, and tried by the Pennsylvania Department of Agriculture, have shown that the following poisonous sprays and dusts will give good control when properly applied. Since all stages of the Mexican bean beetle work on the under surfaces of the leaves, all sprays and dusts should be directed to these parts.

Magnesium arsenate spray or dust is recommended for control, but when this can not be obtained arsenate of lead spray or dust can be used. Some workers report burning with lead arsenate; however, the writer got more burning when calcium arsenate was used.

Any magnesium arsenate or arsenate of lead used should not contain more than one-half of one per cent of water soluble arsenic pentoxide. The following proportions are recommended for sprays and dusts.

Magnesium arsenate as a spray:

Magnesium arsenate	2 pounds
Water	100 gallons

Arsenate of lead as a spray:

Arsenate of lead	2 pounds
Hydrated lime	2 pounds
Water	100 gallons

Magnesium arsenate as a dust:

Magnesium arsenate	1 pound
Hydrated lime	5 pounds

Arsenate of lead as a dust:

Arsenate of lead	1 pound
Hydrated lime	5 pounds

Mixing Dusts

Small amounts of dust can be mixed by placing weighed materials in a lard can and rolling on the floor until the materials are thoroughly mixed. It is advisable to place a small cylinder of chicken wire in the can to break up the dust particles. Larger amounts of dust can be prepared in an ordinary barrel churn with chicken wire in the center to break up the mixture.

Amounts of Sprays and Dusts to Use

When spray is used, both surfaces of the plants should be thoroughly wet. When using magnesium arsenate or arsenate of lead dust 1-5, apply 12 to 15 pounds to the acre. All dust used should be applied with either a hand or power duster and should be directed to the under surfaces of the leaves.

Time to Spray or Dust

Young bean plants should be sprayed or dusted as soon as the leaves unfold, and this should be repeated every ten days or two weeks depending on the rate of growth and amount of rainfall. The foliage should be kept well coated with poison throughout the growing season. Plants should not be sprayed or dusted just before using, and beans from treated plants should be thoroughly rinsed in clear water at least twice before marketing. All dusting should be done when the wind is not blowing.

Cultural Methods of Control

It is advisable to plow under bean plants just as soon as the crop has been harvested. This will destroy many adults and immature stages. Rubbish piles in vicinities of bean fields form ideal hibernating places for the Mexican bean beetles and should be destroyed.